Adobe Creek, Upper Reach 5
Los Altos and Los Altos Hills, Santa Clara County, California
Year- 5 (2013) Riparian Mitigation Monitoring

Permit Numbers:

United States Army Corps of Engineers: 00793S
California Department of Fish and Game: 1600-2007-0452-3
Regional Water Quality Control Board: 02-43-C0562

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EXECUTIVE SUMMARY

BACKGROUND

The Adobe Creek, Upper Reach 5 Restoration Project improved the creek channel, repaired bank and channel bottoms, and restored native riparian habitat. These benefits were achieved by replacing existing and failing hardscape and the concrete channel bottom with a bioengineered channel design that incorporates earthen banks wherever possible, boulders, and planted native riparian vegetation. The overall design of the channel and habitat quality within the reach will be markedly improved over the existing conditions. A Mitigation and Monitoring Plan (MMP) was prepared to set forth the habitat mitigation requirements.

RESULTS

Year- 5 monitoring results indicate that the Adobe Creek, Upper Reach 5 site has exceeded the Year- 5 performance criteria. The site's 37% percent cover for trees, 26% percent cover for shrubs, and 38% percent cover for groundcover exceeded the Year-5 goal of 15% for trees, 7% for shrubs, and 15% for groundcover and most species showed fair to good health and vigor. The freshwater marsh vegetation has recovered well and met the final goal of 0.05 acres in Year-5. The results show that the site will likely meet the performance criteria in subsequent years.

MANAGEMENT RECOMMENDATIONS

1. Avoid removing or damaging plants during routine maintenance activities.
2. Avoid removing or damaging natural recruits during routine maintenance activities.
3. Continue to remove weeds within the planting basins and replenish and maintain a 3-inch thick layer of compost or woodchip mulch as needed.

REQUESTED AGENCY ACTION

No agency action is requested at this time.

INTRODUCTION

The Adobe Creek Upper Reach 5 Restoration Project is located in the City of Los Altos and the Town of Los Altos Hills (Figure 1). The reach begins just upstream of West Edith Avenue and extends downstream for a total length of approximately 1,100 linear feet (Figure 2). In 1999, a watershed planning study was completed for 16 reaches of Adobe Creek. The planning study proposed improvements to the creek channel, repaired bank and channel bottoms, and restored native riparian habitat and adoption of a new maintenance program. Reaches 1-4 were completed in 2004 and consisted of the replacement of the El Camino Real Bridge, installation of a second box culvert at Foothill Expressway, and 7 erosion repair sites. The Upper Reach 5 segment of Adobe Creek was completed in 2008. At this time, there are no plans to complete any of the other reaches.

The Adobe Creek Upper Reach 5 Restoration Project's Riparian Mitigation Monitoring Plan (MMP) outlines the project's impacts on biological resources occurring on the site and the onsite mitigation and monitoring measures proposed as compensation. The MMP set forth the habitat mitigation requirements to compensate for impacts to United States Army Corps of Engineers (USACE) and California Department of Fish and Game's (CDFG) jurisdictional areas.

The Upper Reach 5 mitigation site is comprised of 0.76 acre of native riparian trees, shrubs, and flood tolerant plants appropriate for Adobe Creek to offset construction impacts. The project construction has resulted in substantial improvements to the habitat structure and functions of this section of Adobe Creek. These improvements include repairing and stabilizing eroded banks, removing accumulated sediment under the W. Edith Avenue Bridge, improving channel conveyance and overland flow capacities, removing barriers that inhibit native fish passage, and all while minimizing or avoiding environmental and right of way impacts related to the project.

Table 1 summarizes the total number of plantings installed at the 0.76-acre mitigation site in 2008, as well as the number of replants installed in 2010. The updated plant totals include both replants and the surviving plants from Year-1; these totals will be used to determine percent survival in the following years.

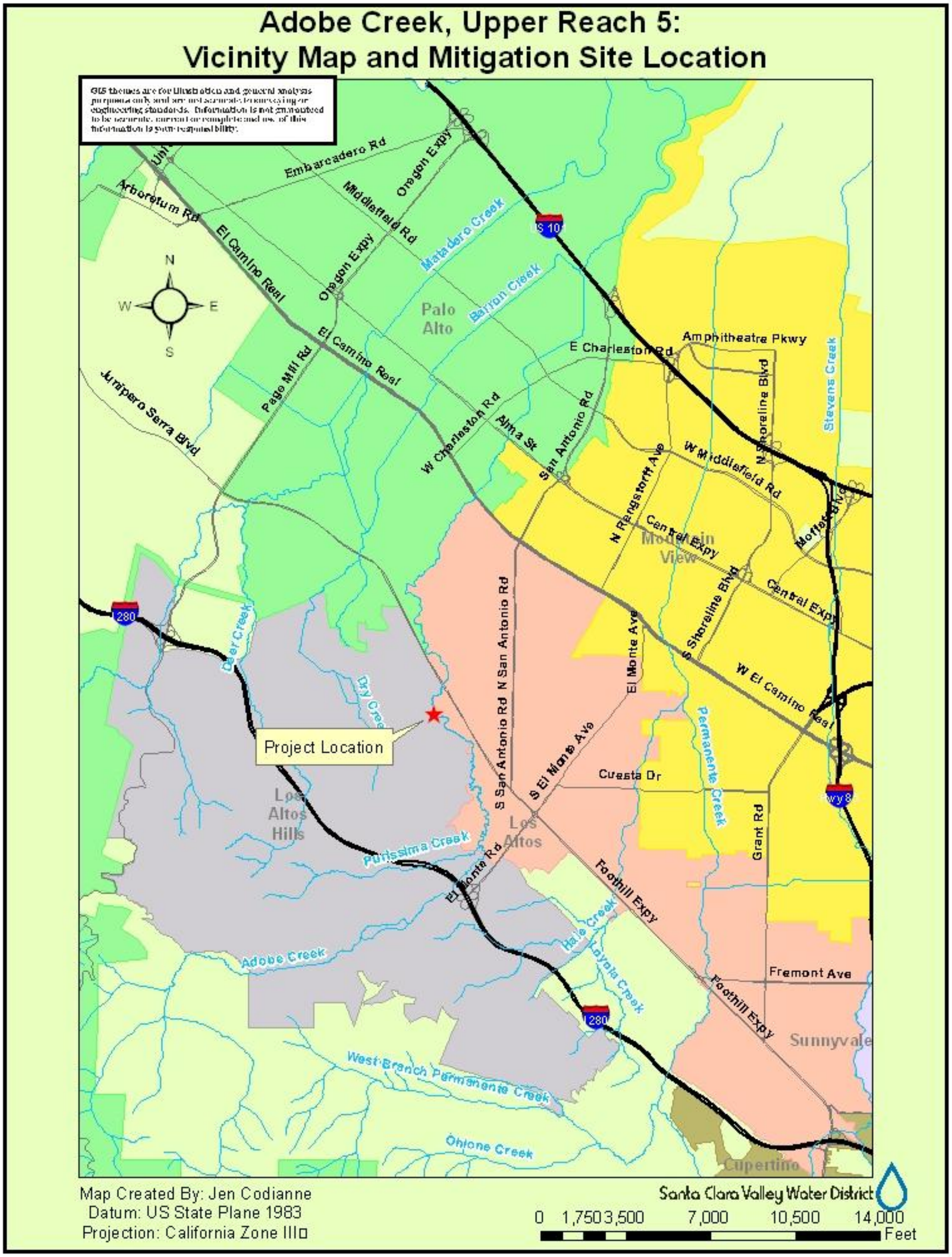
Table 1. Total Quantities of Plants Installed in 2008 and replants installed in 2010.

Botanical Name	Common Name	Replants 2010	Total Planted
Acer macrophyllum	Big leaf maple		8
Aesculus californica	California buckeye		7
Alnus rubra	Red alder		8
Bacharris pilularis	Coyote brush		9
Ceanothus spp.	Wild liliac	4	111
Cercis occidentalis	Western redbud		2
Clematis ligusticifolia	Western virgin's bower		19
Cornus glabrata	Brown dogwood	50	37
Cornus sericea	Western dogwood	108	46
Heteromeles arbutifolia	Toyon	2	70
Lepechinia calycina	Pitcher sage		15
Leymus triticoides	Creeping wild rye	15	173
Lonicera hispadula	Honeysuckle		16
Platanus racemosa	Western sycamore		10
Prunus ilicifolia	Holly-leaf cherry		9
Quercus agrifolia	Coast live oak		21
Quercus lobata	Valley oak		4
Rhamnus californica	Coffeeberry		30
Ribes aureum	Golden currant	8	26
Ribes sanguineum	Pink Flowering currant		35
Rosa californica	California rose		13
Rosa gymnocorpa	Wood rose		26
Rubus ursinus	California blackberry		27
Salix laevigata	Red willow		96
Salix lasiolepsis	Arroyo willow		108
Salix spp.	Unidentified willow	**25**	45
Sambucus mexicana	Blue elderberry		7
Symphoricarpos albus	Snowberry		15
Symphoricarpos mollis	Creeping snowberry		20
Vitis californica	California grape		4
TOTALS		**212**	**1,017**

The MMP outlines the project's required performance criteria and monitoring, it states that the site will be monitored during the growing season for a minimum of 10 years after plant installation. Monitoring will be conducted annually through Year-6 and than once in Years-8 and 10. Wetland habitat monitoring will be conducted in Years 2-5.

In Year-10 the results of the monitoring will be compared to the final success criteria to determine if these criteria have been met. If the final success criteria have not been met than remedial actions and monitoring will continue until they have been met. The following report contains the results of the Year-5 monitoring and addresses the success criteria specified in the MMP.

Figure 1. Vicinity Map and Mitigation Site Location.



MONITORING METHODS

OVERVIEW

Plants were monitored using percent cover sampling for Year-5 monitoring. A quantitative assessment of plant vigor and health was made for each woody species planted within a 20 foot radius that originated at a randomly selected point along each transect. Vigor was an individual rating given to each plant. A plant was assessed as "dead" if in excess of 75% of the plant appeared as diseased, defoliated, or in decline. Allowances were made for species that have drought dormancy or similar condition that would misrepresent the health of the plant. Notes were made regarding maintenance, disease, browse, vandalism, natural recruitment, or other conditions that were relevant to the assessment. This report is not meant to contain all of that information. The monitoring methods were consistent for early establishment sites with small numbers. Monitoring was done the second week of October 2013.

In accordance with the MMP, percent cover sampling will begin when plant survival counts are no longer feasible due to plant growth or recruitment. Percent cover sampling will begin no later than Year-6. As such, percent cover was taken in Year-2 due to plant survival counts no longer being feasible. Monitoring percent cover was measured using the line intercept method (Bonham 1989) and utilizing transects that were established in Year-1 (Figure 2).

PERCENT COVER

Vegetation data was collected by means of permanent transects. Transect locations were determined via a random–stratified method. Eight permanent transects were established in Year-1. Percent cover data was collected via randomly located transects. The position of permanent transects were marked using a differential GPS unit with sub-meter accuracy, metal stakes were also used to mark transect end points. Percent cover was determined using the line intercept method and was calculated for trees, shrubs, and groundcover.

PLANT HEALTH AND VIGOR

A quantitative assessment of plant vigor and health was made for each woody species planted within a 20 foot radius that originated at a randomly selected point along each transect. Ratings were compiled by species to provide an overall species health and vigor rating. Vigor ratings were assigned on a scale of 0 to 4 (Table 2).

Table 2. Health and Vigor Rating Scale.

Health and Vigor Numerical Rating	General Condition	Specific Criteria
0	Dead	
1	Poor	>75% of plant affected by cumulative symptoms
2	Fair	25-75% of plant affected by cumulative symptoms
3	Good	<25% of plant affected by cumulative symptoms
4	Excellent	<5% of plant affected by cumulative symptoms

NATURAL RECRUITMENT

Natural recruitment of seedlings of woody plant species was quantitatively monitored. The number of naturally recruited native and non-native woody plant species were counted within a 5 foot wide band along each transect. General observations of natural recruitment were also noted throughout the site.

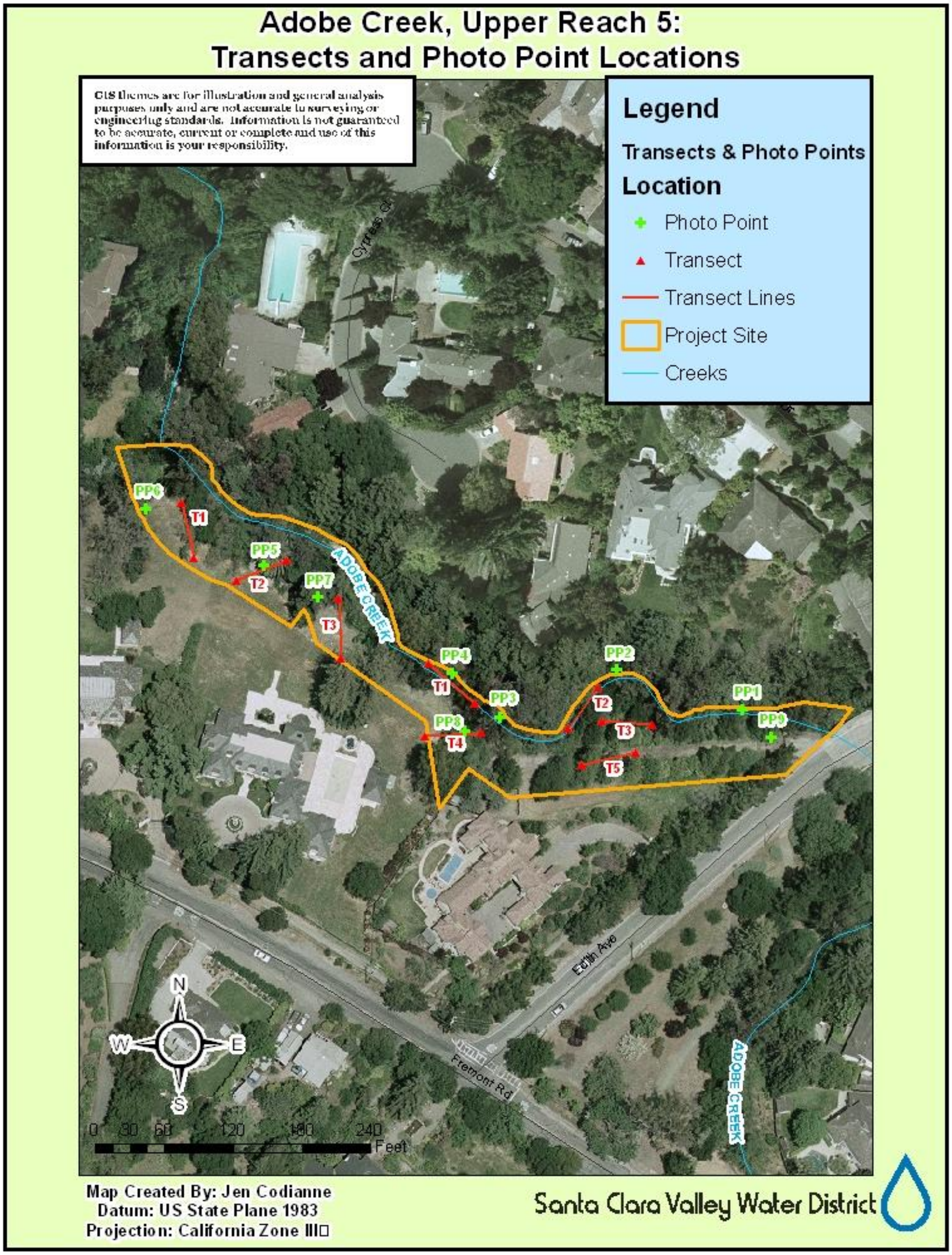
WETLAND HABITAT

An assessment will be conducted at the channel modification sites starting in the second year following the site construction to determine the post-project re-colonization and acreage of freshwater marsh habitat in the USACE jurisdictional area in the Project reach. The post-project acreage will be compared to the pre-project acreage (0.05 acres) to assure that there is no net loss of this habitat. If freshwater marsh vegetation is not present within the Project reach after the fifth year, the site will be seeded with seeds from Adobe Creek.

PHOTO-DOCUMENTATION

Photographs of the site were taken with a digital camera at locations shown in Figure 2. A subset of these photographs is shown in Appendix A.

Figure 2. Transect & Photo Point Locations.


Adobe Creek, Upper Reach 5:
Transects and Photo Point Locations
GIS themes are for illustration and general analysis purposes only and are not accurate to surveying or engineering standards. Information is not guaranteed to be accurate, current or complete and use of this information is your responsibility.
Legend
Transects & Photo Points
Location
Photo Point
Transect
Transect Lines
Project Site
Creeks
Cypress Ct
PP6
T1
PP5
T2
PP7
T3
ADOBE CREEK
PP4
T1
PP3
PP2
T2
PP8
T4
T3
PP1
PP9
T5
Edith Ave
Fremont Rd
ADOBE CREEK
N
W
E
S
0 30 60 120 180 240
Feet
Map Created By: Jen Codianne
Datum: US State Plane 1983
Projection: California Zone III
Santa Clara Valley Water District

RESULTS

PERCENT COVER

Table 3. Percent Cover.

Mitigation Site	Transect #	% Cover Trees 2013 (Yr-5)	% Cover Shrubs 2013 (Yr-5)	% Cover Groundcover 2013 (Yr-5)
North Bank	1	22%	10%	46%
	2	0%	0%	2%
	3	12%	12%	62%
South Bank	1	64%	100%	70%
	2	60%	30%	8%
	3	46%	30%	58%
	4	48%	7.2%	8%
	5	42%	20%	50%
TOTAL PERCENT COVER		**37%**	**26%**	**38%**

PLANT HEALTH AND VIGOR

Table 4. Average Health and Vigor in Year 5. Years 1, 2, & 3 are shown for comparison.

Common Name	Year-1 (2009) Average H&V	Year-2 (2010) Average H&V	Year-3 (2011) Average H&V	Year-4 (2012) Average H&V	Year-5 (2013) Average H&V
Acer macrophyllum	3.67	3.8	3.72	3.78	3.65
Alnus rubra	3.8	3.9	4.0	4.0	3.8
Ceanothus spp.	3.68	3.75	3.18	3.0	4.0
Cornus glabrata	3.5	3.9	4.0	3.8	3.9
Cornus sericea	3.29	3.65	4.0	3.5	4.0
Heteromeles arbutifolia	3.72	3.9	4.0	4.0	4.0
Platanus racemosa	4.0	4.0	4.0	4.0	4.0
Prunus ilicifolia	3.0	3.45	3.5	3.8	4.0
Quercus agrifolia	4.0	4.0	3.9	4.0	4.0
Quercus lobata	4.0	4.0	4.0	4.0	4.0
Ribes aureum	2.86	3.4	3.6	3.4	3.2
Ribes sanguineum	2.17	3.2	3.5	3.6	3.3
Rhamnus californica	3.86	3.9	3.6	3.8	3.5
Salix spp.	3.56	4.0	3.54	3.9	3.8
Overall Average	**3.51**	**3.78**	**3.75**	**3.8**	**3.79**

Note: 0= Dead; 1= Poor Condition; 2= Fair Condition; 3= Good Condition; 4= Excellent Condition

NATURAL RECRUITMENT

There were numerous naturally recruited Brown dogwoods, Coyote brush, Coast redwoods, California blackberries, California rose, Creeping wild rye, Snowberry, and Coast live oaks throughout the site.

WETLAND HABITAT

Table 5 shows the acreage of Native vs. Non-native wetland species in the freshwater marsh habitat in Year 5.

Table 5. Wetland Species List in Year 5.

WETLAND SPECIES LIST:	Species Type	Species Nativity	SQUARE FEET
	Urtica dioica	Non-Native	2,037
	Nasturtium aquaticum	Native	275
	Salvia apiana	Native	9
	Helenium autumnale	Native	5
TOTAL SQUARE FEET NATIVE WETLAND SPECIES:			**289**
TOTAL SQUARE FEET NON_NATIVE SPECIES:			**2,037**

DISCUSSION

HABITAT DEVELOPMENT AND COMPARISONS TO SUCCESS AND PERFORMANCE CRITERIA

The percent cover and health and vigor data indicate that the mitigation site is developing toward the restoration of high quality riparian habitat. The performance criteria are quantitative benchmarks against which revegetation progress is tracked. The habitat restoration criteria evaluated are described below.

The MMP states that the final success criterion for average percent cover will be met in ten years following plant installation. For areas interplanted with trees and shrubs, average percent cover will be fifty percent by native trees, twenty percent by native shrubs, and fifty percent by native groundcover. If tree cover exceeds the final goal, the final success criteria for shrub cover may be reduced by a corresponding amount.

The percent cover tree and shrub survival in Year-5; 37% percent cover for trees, 26% percent cover for shrubs, and 38% percent cover for groundcover exceeded the Year-5 goal of 15% for trees, 7% for shrubs, and 15% for groundcover. The average health and vigor rating of 3.79 indicates that the trees and shrubs are in good condition. The freshwater marsh vegetation post-project acreage in Year-5 was 2,326 square feet and has met the pre-project acreage (0.05 acres) goal to assure that there is no net loss of this habitat. Overall, the majority of plant species are doing well, and positive results of the replanting effort can be observed via the increased vegetation cover.

NATURAL RECRUITMENT

Significant natural recruitment should not be expected for several years until the site has had a chance to mature and propagules to germinate. However, there were numerous Brown dogwoods, Coyote brush, Coast redwoods, California blackberries, California rose, Creeping wild rye, Snowberry, and Coast live oaks throughout the site.

EVALUATION OF MAINTENANCE PRACTICES

Maintenance activities have been successful.

MANAGEMENT RECOMMENDATIONS

1. Continue to remove weeds within the planting basins on a regular basis. Continue to replenish and maintain a 3-inch thick layer of compost or woodchip mulch within the planting basins, taking note that a small barrier between the mulch layer and plant stems should be maintained to prevent rot. Maintain the weed layer throughout the site to no higher than 1-foot.
2. Evidence of browse damage should be monitored and foliage protection cages installed and secured on those plants that are showing evidence of noticeable browse damage.
3. Maintenance crews should continue to take special care to avoid removing or damaging natural recruits during routine site maintenance.

LITERATURE CITED

Bonham, C.D. 1989. Measurement of Terrestrial Vegetation. John Wiley and Sons, New York.

EDAW. 2007. Final Riparian Mitigation Monitoring Plan Adobe Creek, Upper Reach 5. Prepared for Santa Clara Valley Water District. EDAW.

APPENDIX A.
PHOTO-DOCUMENTATION

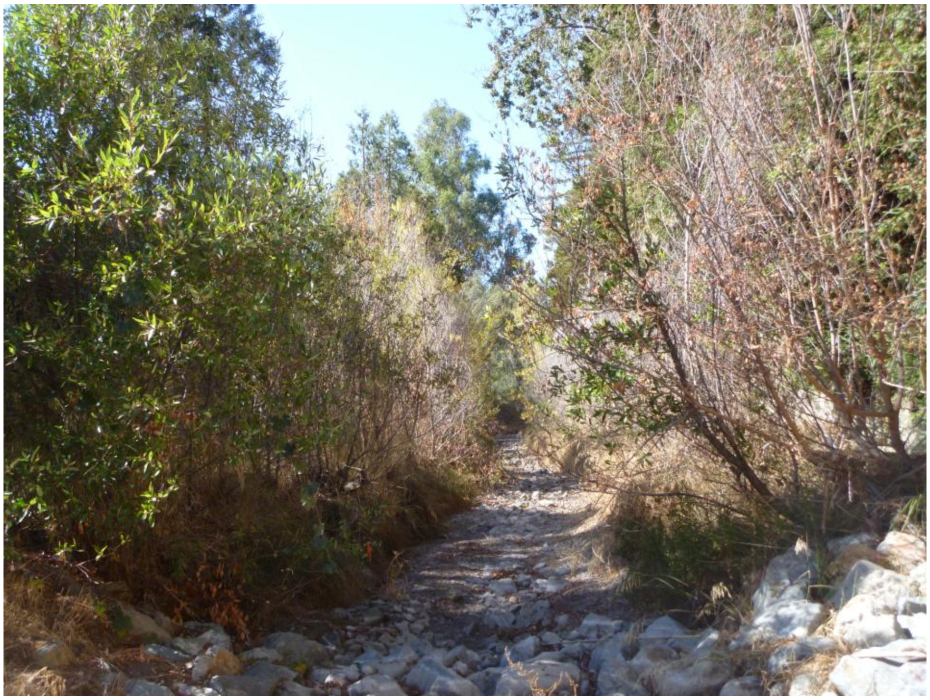


Photo Point 1: North Bank looking downstream.

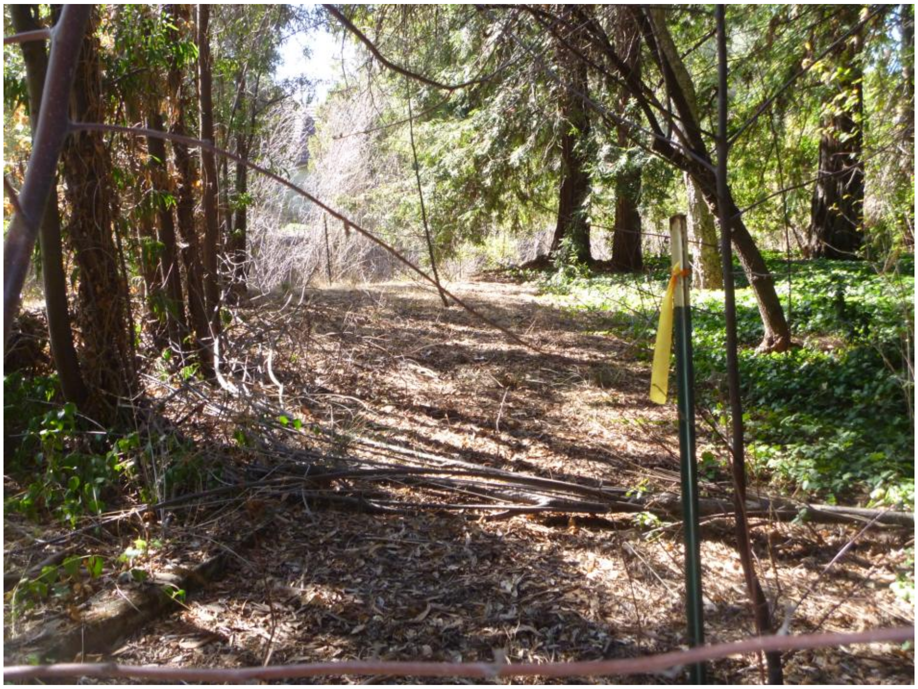


Photo Point 2: On outer curve of Oxbow looking downstream.

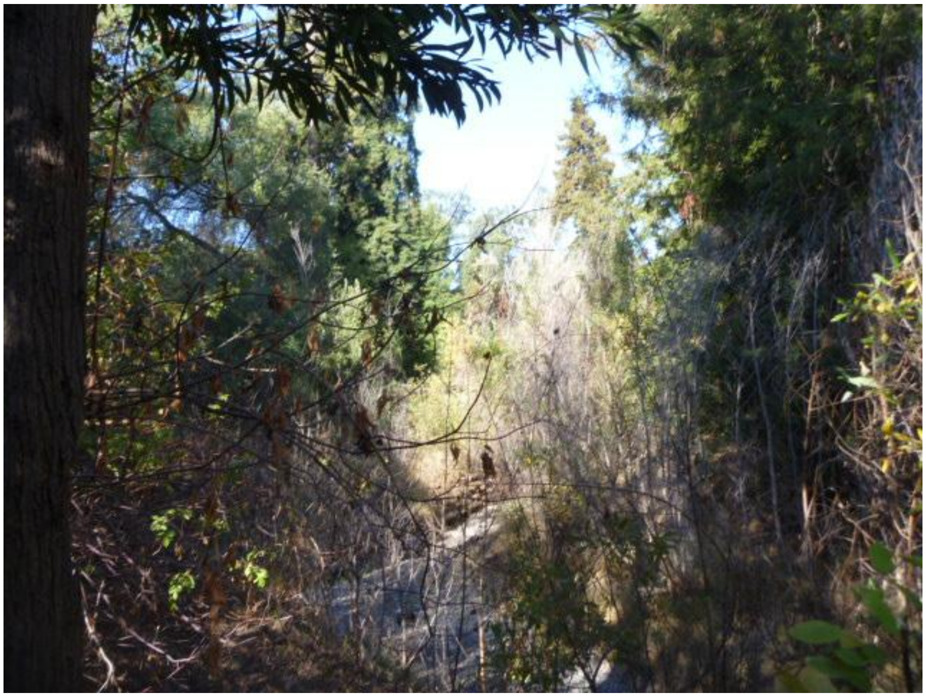


Photo Point 3: On North Bank downstream of Oxbow looking towards South Bank.

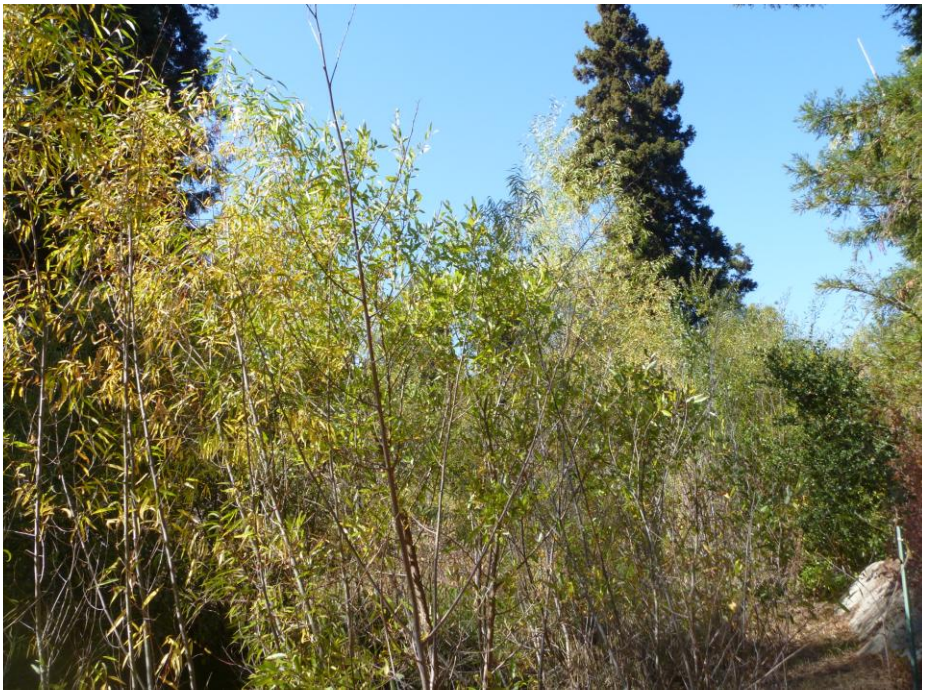


Photo Point 4: On North Bank looking downstream towards South Bank.

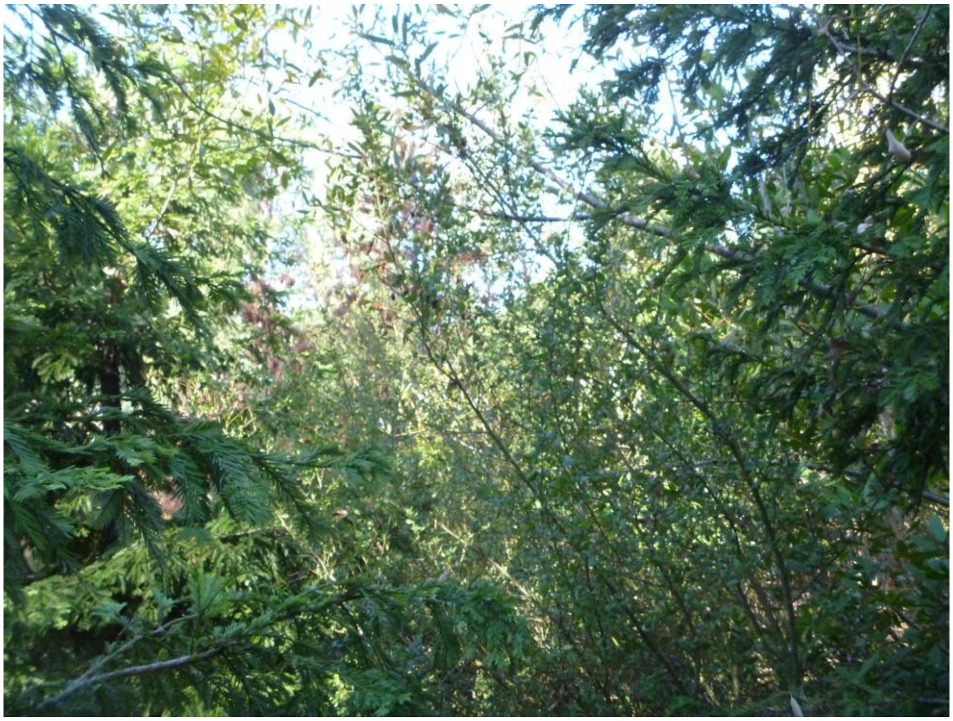


Photo Point 5: On South Bank looking downstream toward end of project area.

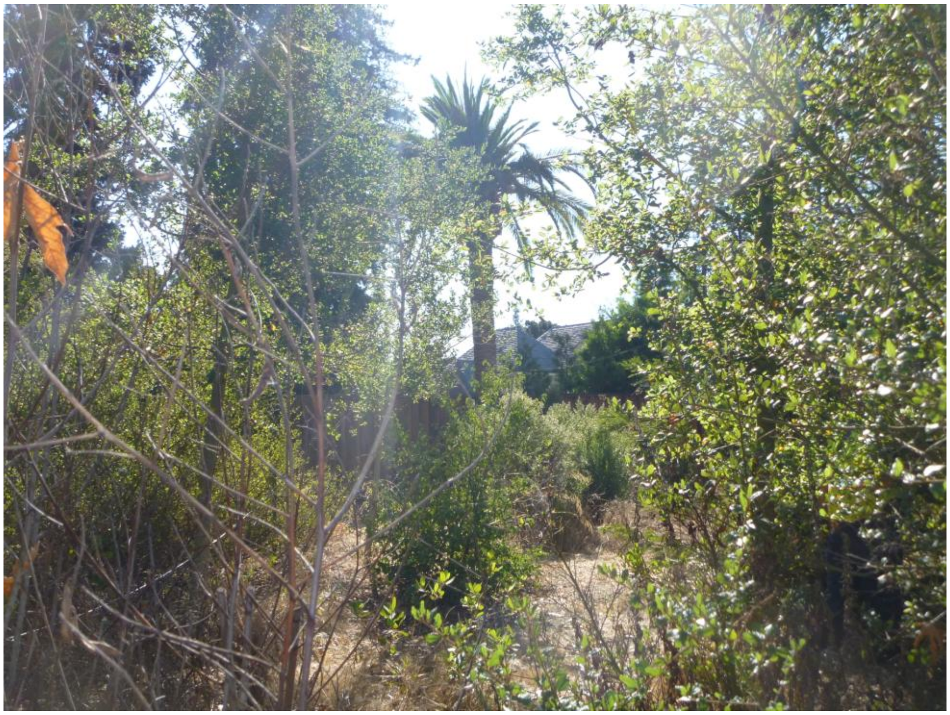


Photo Point 6: On South Bank looking downstream.

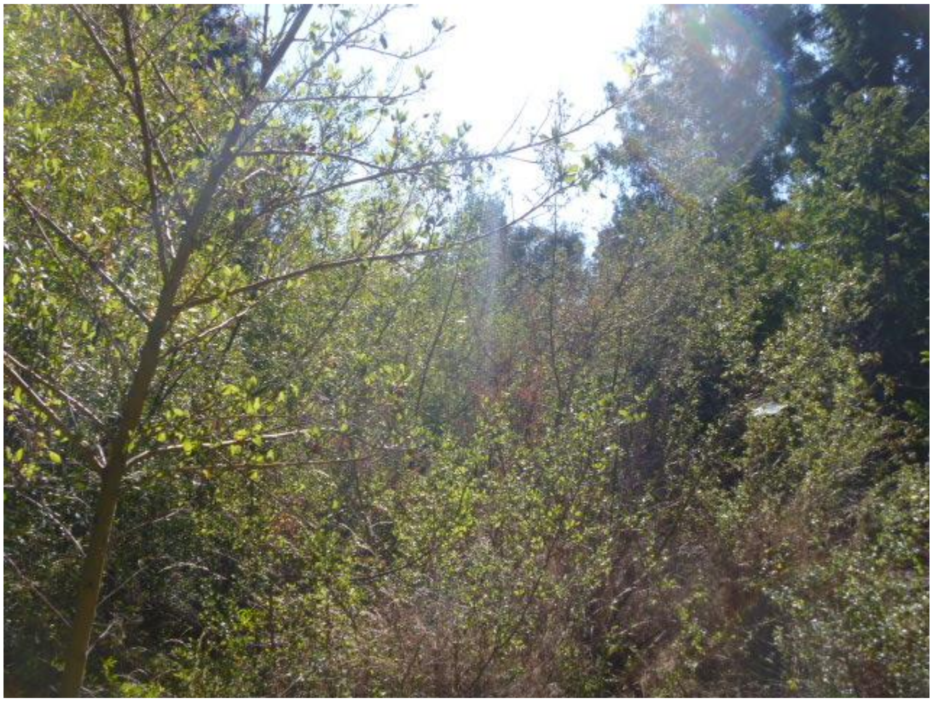


Photo Point 7: On South Bank looking upstream at curve of creek.

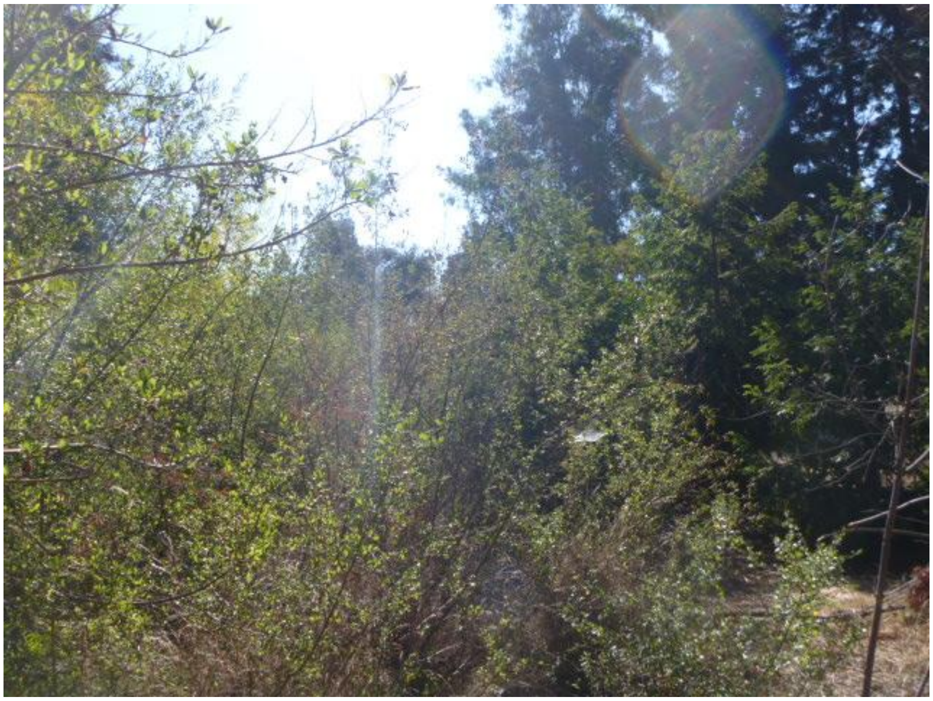


Photo Point 8: On South Bank looking upstream.

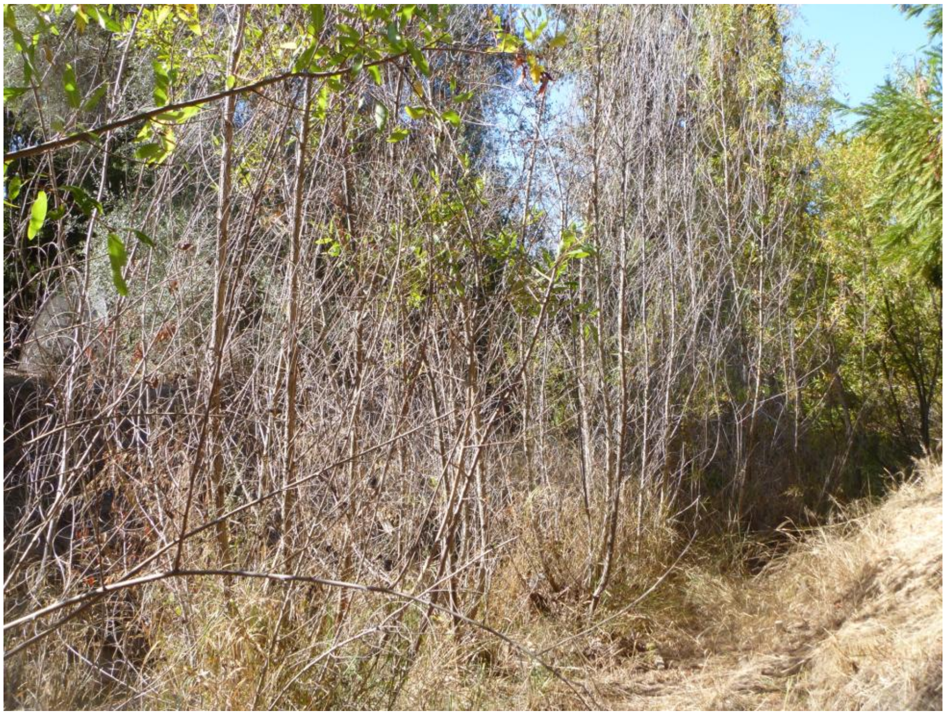


Photo Point 9: On North Bank looking downstream on South Bank.